

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

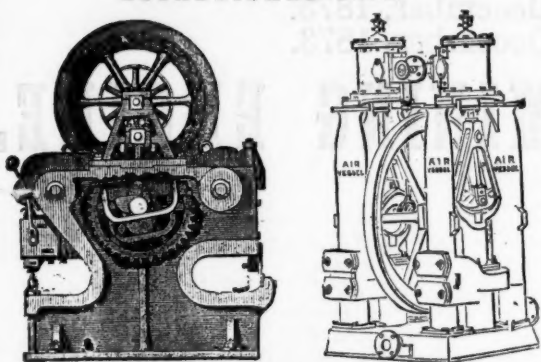
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No. 2055.—VOL. XLV.

LONDON, SATURDAY, JANUARY 9, 1875.

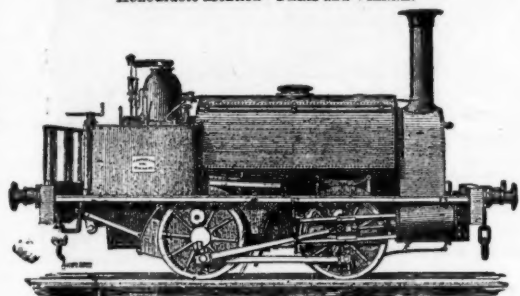
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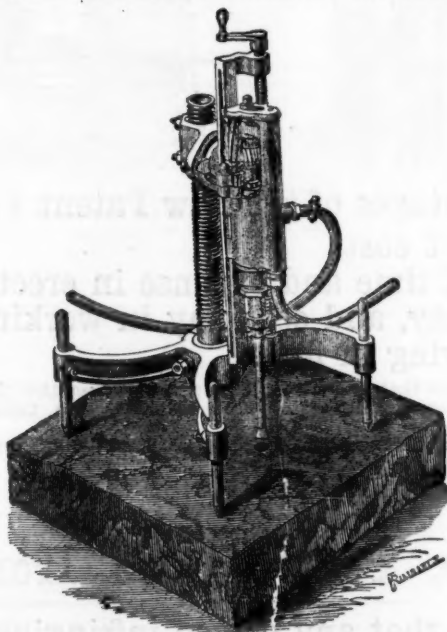
BARROW WATERWORKS TUNNEL;

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L'Administrateur Délégué,
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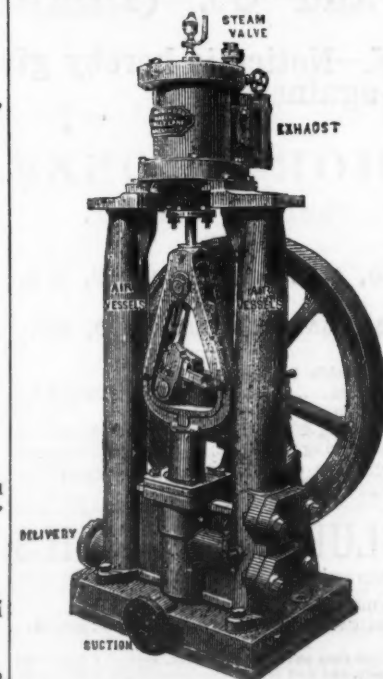
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Is extensively used at the principal Mines, Collieries, and Quarries of Great Britain, and the Continent of Europe.

"To this invention, which appears to possess several advantages over the machines previously exhibited at Falmouth, the Judges are unanimous in awarding a first-class silver medal" (the highest award).—*Report of the Judges at the Royal Cornwall Polytechnic Society's Exhibition, 1873.*

"The boring machine works splendidly."—W. TORRANCE: *Mid-Caldor.*

"For simplicity, compactness, and performance of work, your drill excels all others."—JOHN MAIN: *Crossfield Ironworks.*

"Under the most difficult circumstances, they give every satisfaction."—G. GREY: *Montreal Iron Mines, Cumberland.*

"The simplest and best boring machine."—Capt. WASLEY's letter to the *Mining Journal*, Oct. 18, 1873.

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The advantages over other Rock-boring Machines claimed for the "Kainotomon" are—

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- 6.—It has not one-third the number of parts in its construction.
- 7.—All stuffing-boxes and parts requiring adjustment are dispensed with.
- 8.—It is so simple in its construction that any ordinary labourer or miner can drive it, simply having to turn on the motive power and feed the drill.
- 9.—The rotation is compulsory, and regular.
- 10.—40 lbs. pressure only is required to work it.
- 11.—A saving of over 50 per cent. in iron and flexible piping.

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THOS. A. WARRINGTON, 30, KING STREET, CHEAPSIDE, LONDON, E.C.

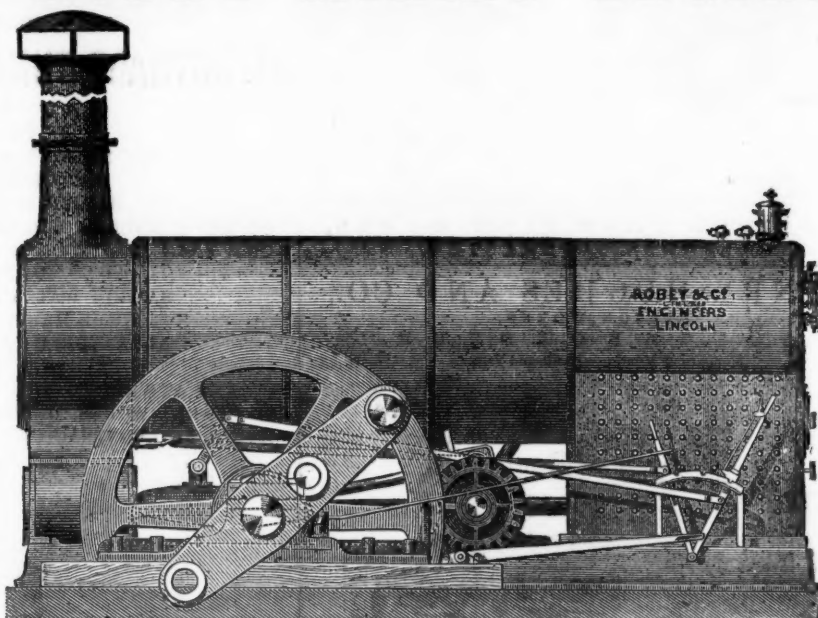
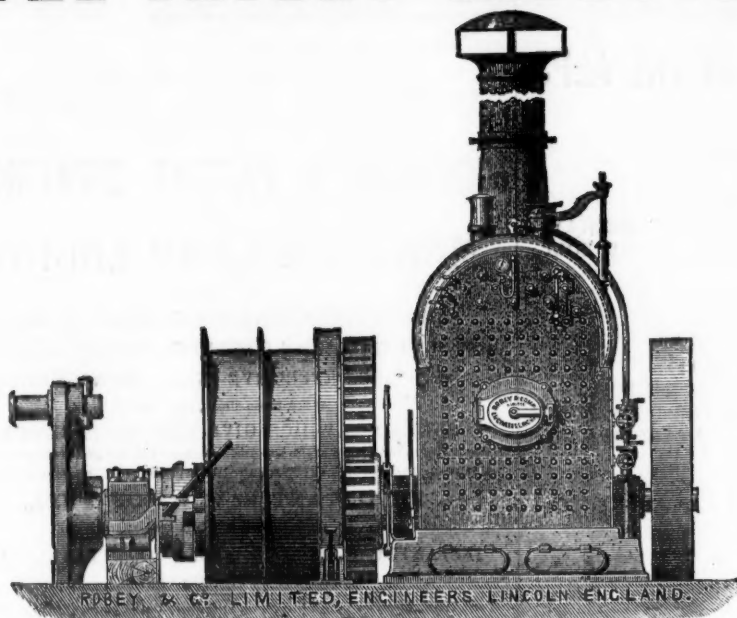
Patent No. 4136

Dated 16th December, 1873.

Patent No. 4150

Dated 17th December, 1873.

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- Small first cost.
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- Ease, safety, and economy in working.
- Great saving in fuel.

This New Patent Engine is free from all the objections that can be urged against using the old style of Semi-Portable Engine for permanent work, because it possesses the rigidity and durability of the Horizontal Engine, and at the same time retains the advantages of the semi-Portable, in saving time and expense in fixing.

This New Engine is admirably adapted for driving Flour Mills, Saw Mills, Brick Machines, Pumps, Ore Crushers, Stone Breakers, and all descriptions of Fixed Machinery.

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"DON ECONOMIC" LUBRICATING OIL, from 2s. 3d. to 2s. 6d. per gallon, according to quantity.

Mr. ALFRED HEWLETT, Wigan Coal and Iron Company, says—"I have used the Don Oil for nearly two years, and find it to answer exceedingly well for purposes of lubrication."

Consignees put on most favourable terms.

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THIS OIL is suitable to every kind of Machinery; it is used almost exclusively in Her Majesty's Dockyards and Fleet, and by the War Office and East India Government; as well as by the Royal Mail Steam Packet Co., Pacific Steam Navigation Co., P. and O. Co., Cunard Co., and by most of the other important Royal Mail Steam Fleets in the kingdom. It is also extensively employed on the various railways, and by many of the leading engineering and manufacturing firms at home and abroad.

"I hereby certify that the Rangoon Engine Oil, manufactured by Messrs. Charles Price and Co., is free from any material which can produce corrosion of the metal work of machinery. It is calculated, indeed, to protect metallic surfaces from oxidation, and, from its peculiar character, is not liable to lead to spontaneous combustion of cotton waste or any similar material which might become imbued with it, as is the case with Rape, Gallipoli, and Olive Oils. The lubricating power of this oil is equal to Sperm or Lard Oil."

T. W. KEATES, F.C.S., &c., &c., Consulting Chemist to the Board of Works

Extract from Mr. BAXTER'S Speech in the House of Commons, May 31st, 1870:—
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Every parcel of the Oil sent from the Works bears the Trade Mark of the Firm, and as many spurious imitations of the Rangoon Engine Oil are sold purchasers are requested to observe that none is genuine which does not bear this mark.

Oil, Tallow, and Colour Merchants, Seed Crushers, Turpentine Distillers, &c.

London: CASTLE BAYNARD, UPPER THAMES STREET, & MILLWALL, POPLAR.—Works: ERITH, KENT

VARLEY & YEADON, COLLIERY & BRICK-MAKING ENGINEERS,

Manufacturers of WINDING, HAULING, and PUMPING ENGINES, Boilers and Fittings, Steam Piping, Donkey Pumps, Lift Pumps, Perforated Clay and Mortar Mills, Brick Presses, Pug Mills, Round and Flat Rope, Pit-head Pulleys, Wrought-iron Head Gear, ROOFS and GIRDELS, Kibbles, ONE, TWO, and THREE-DECK CAGES, COAL TIPPING and SCREENING APPARATUS, VENTILATING FANS, TUBBING, GIRDELS, PILLARS, POINT PLATES. Steam or other Cranes, Crabs and Windlasses, Machines for Cutting Stone, &c.

CROWN POINT FOUNDRY, LEEDS.

Estimates furnished on application.

Original Correspondence.

MINING ON THE PACIFIC COAST—NEVADA.

TYBO MINING DISTRICT, NYE COUNTY, NEVADA, AND THE TYBO CONSOLIDATED SILVER MINING COMPANY (LIMITED) OF LONDON—No. II.

SIR,—Having in my last letter made my introduction to the public I will now, through the same agency then invoked—your excellent Journal—make an effort to retain its confidence by truthfully delineating the chief characteristics of the districts adjacent to this camp. I cannot, of course, within the limits I have prescribed for myself in this article deal with more than the salient features which they present, mineralogically considered. I will, however, enter into detail whenever necessary or desirable, for I intend to be plain in my statements, and to chronicle nothing that cannot be borne out by facts. I will notice these districts according to their distance from here; and, in order to carry this out, the first of them that claims our attention is—

RATTLESNAKE CANYON.—This is situated seven miles to the northward of here, in the same range of mountains. It is easily approachable from either here or Hot Creek, a small settlement located further north, at a point where the Eureka and Belmont roads intersect each other. The district was prospected, and proclaimed a mining camp, some few years ago, but much attention has not been bestowed upon it latterly, on account of the smallness of its lodes, which in some instances are not more than 4 in. to 6 in. thick. This defect is, however, made up in the increased richness of their ores, which in many well-authenticated cases, yielded on being milled from \$250 to \$5000 to the ton of 2000 lbs. The ores of the district are free milling, showing no sulphurets, and carrying but very little lead, certainly not sufficient to exercise material influence upon the milling operations. Having faith in the future, many of its original hardy, bronze-faced discoverers still cling to its fortunes, being still animated with the hope of their being one day remunerated for all they have had to endure. The country hereabouts is mountainous, and wherever prospected has given ample evidence of the presence of the precious metals in greater or less quantities.

The next place of note that we come to, still travelling northwards, is **MOREY DISTRICT**, which lies snugly embosomed amidst the hills which shoot out laterally from the eastern slope of the above range of mountains. This camp is contiguous to the Eureka road, from which it is approached by an easy grade, skirting the hills to the east of the mines. It is distant about 65 miles from Eureka and 35 miles from Tybo. Its leading mines are at present owned and worked by the Morey Silver Mining Company, whose head quarters are in New York, as are the residences of the majority of its shareholders. The ores of the district, which is about 12 miles square, are free milling, showing a little lead, but exhibiting no trace of the sulphurets which cause so much annoyance to the metallurgist in the reduction of the ores in which they are found. The skillful and educated metallurgist, who has an acquaintance with the laws of chemical science, and who is an acute and practised observer, will, however, readily find means to subject refractory ores to his will. We know that the aim of the metallurgist, or of the metallurgical art, is to furnish such means as will most readily accomplish the separation of the metals, under the conditions laid down by the science of metallurgy. These things, however, apply more directly to the smelting than to the milling process. The art of smelting ores was known to and largely practised by the ancients, whose acquaintance with the science of metallurgy assisted them largely in the separation of the baser elements, such as copper, iron, or sulphur, from the purer and more precious metals.

But to return from this digression, or dissertation, as it may be termed, upon the philosophy of the metallurgical and smelting operations practised throughout the areas of antiquity, I will state that there is a 20-stamp mill erected upon the above property, which appears to be kept in constant use, to judge from the amount of the silver bars that are each month shipped from it to New York per Wells, Fargo, and Co.'s express. The mines owned by the aforesaid company have been worked with considerable profit since they were purchased, and the indications are strongly in favour of the supposition that future developments will increase rather than diminish these profits. The whole country between here and Eureka is mineral bearing in aspect, and ores of a good quality have been discovered at various places along the ranges which connect the former and latter place. Wood and water, two important elements, are found in abundance along this section of country.

The next place worthy of mention outside of Tybo is **BELMONT**, an old and sterling mining camp of several years standing. It is located in the mountains at a point 35 miles to the south-east of this place. It has many valuable mines within its borders, and also possesses two mills, of 20 stamps each, wherein their ores are reduced. The most noticeable mines in the district are, however, the Belmont, the Monitor Belmont, and the El Dorado, north and south. The companies owning these valuable properties have been incorporated in San Francisco, in whose stock boards the value of their shares are daily quoted. The next few months will witness a marked increase in the value of these mines, particularly in the former, for the character of the developments and the magnitude of the improvements that are projected lead to this conclusion. This mine has a ledge 6000 lineal feet in extent, and maintains a uniform thickness of 7 ft. from wall to wall throughout its length, and will be, with the advent of the next vernal season, opened from end to end to a depth of several hundred feet. In addition, new and powerful hoisting machinery is to be placed over perpendicular shafts sunk at opposite ends of the lode, which will greatly facilitate mining operations. The shares of this company changed hands some months ago at \$35 each, but there has been a very marked decline in them lately, owing to the almost entire suspension of active work, for the purpose of opening new levels, sinking shafts, &c. The ores from this and the other mines have run from \$200 away into thousands. The district has a population of about 800 souls variously engaged at mining, milling, farming, and commercial pursuits. The town does not differ materially from the majority of the mining towns of the State. These and others are often pervaded by a dull sameness, not reliable to the eye of a connoisseur in architectural ornamentation. Once in awhile, however, there are substantial and ornamental structures met with in these segregated, and in part isolated, mountain towns.

Twelve miles to the north-west of Belmont we come to **JEFFERSON CANYON**, a newly-established mining district, distant 47 miles from Tybo, and situated in the heart of a country rich in mineral deposits. This place, though not above half-a-dozen months old, has made giant strides towards material wealth and prosperity. It is already in the possession of two stamp-mills, that have since their erection been steadily running on the ores of its mines. The best developed of these are the Prussian, north and south, which contain free milling ores. These mines are opened both by shafts and tunnels, which have exposed a well-formed ledge, of an average thickness of 4 ft., enclosed between well formed and well defined foot and hanging walls. The country rock consists of porphyry and lime, with quartz stratifications alternating. The accounts that have reached us lately from them are highly encouraging; the value of the rock being sustained by recent milling operations. The ores yield all the way from \$100 to \$10,000. These last figures, however, have been derived from small parcels of picked rock, and afford no criterion whatever. The mills, according to reliable information, are at present doing well, the ore working as high as \$500 per ton, and experienced miners with whom I have recently conversed, who have visited the district, are of the opinion that these results will be largely increased as depth is attained in the mines. This camp has opened out a large and valuable section of country, and has demonstrated to the satisfaction of the most sceptical how general is the diffusion of the precious metals throughout the wild and rugged mountains of this State.

REVELLE DISTRICT lies 35 miles due south of Tybo. This is an important mining district, but its mines have not been very generally worked of late, owing to some misunderstanding among the

principal owners. There is a fine 20-stamp mill erected there, that by-and-by will be brought into requisition in the reduction of its valuable ores.

There are many other districts lying south and east of here that I cannot now pay attention to. I have, however, given instances enough to show how important a district Tybo is destined to become. Tybo, Nye County, Nevada, Dec. 13. J. D. POWER.

THORNHILL REEF MINING COMPANY.

SIR,—Allow me through the Journal to call the attention of my fellow-shareholders to the need of at once supporting the directorate by applying for the 15 per cent. preference shares in this company, and I do so the more urgently as it is admitted by the report just to hand from disinterested parties, who stand high in the colony, that the mine is undoubtedly a good one, well furnished with splendid machinery, with good auriferous quartz reef, and easy to work. You are aware that a few months back the shares were selling at 100 per cent. premium, but from want of capital to open out the paying ground they are now quoted $\frac{1}{2}$ dis. How is it that a good little mine like this, with its small capital, has not amongst its holders of 20,000 shares a few spirited enough to raise the small amount of 3000*l.* to place it in a flourishing condition? If it were an American venture one would not be surprised, but seeing it is an English undertaking, in a British colony, under British laws and government, the wonder is that shareholders are so blind to their own interests as not to come forward and put the mine upon a proper working footing. Knowing the only alternative which will be resorted to unless a sufficient number of preference shares are applied for, I call upon my fellow-shareholders to at once promptly fill up their application forms, and save their own property from liquidation. If this is done I have not the least doubt that Thornhill Reef shares will in a short time again command a substantial premium on the market.

A SHAREHOLDER ALIVE TO HIS OWN INTEREST.

UTAH AND FLAGSTAFF MINES.

SIR,—I see by the report of the meeting of the Utah Mining Company, in the Journal of Nov. 14, that the Chairman stated that the concentration works only, and not the mine, had been leased. It is, however, a well-known fact here that the mine is being worked and ore sold from it, and it is further stated on good authority that the timbers are being removed from the old workings, so that in all probability by the expiration of the lease the mine will be destroyed for all practical purposes.

Mr. Longmaid is understood to have leased the Ophir Mining Company's property in East Canyon, and, it is said, expects to make large profits. It is difficult to assign a reason for his unfavourable report on the mine, but that it has not been borne out is evident from the fact that the lessee is making large profits out of the leavings, and is also taking out large quantities of carbonate ore, which sells at considerable profit over expenses.

In a former issue of the Journal it was stated that the Flagstaff was not looking well. It is not credited here, where the mine is regarded as a splendid and improving property, but it is easy to see why those now in possession of it will do their best to discourage the shareholders by bad reports, or any other means, from any attempt to regain control of their property. That the mine proved unprofitable for one quarter to the shareholders is not surprising to those who know how very profitable it is proving to others.

Salt Lake City, Dec. 8.

T. A. BENNETT.

CAPE COPPER MINING COMPANY.

SIR,—A "Shareholder," in last week's Journal, stated that the copper ore on hand, as per last report, was valued at 33 $\frac{1}{2}$ per cent., whereas, referring to the report, I find it is calculated at 32 $\frac{1}{2}$ per cent., and as not a small portion of the ore sold on Dec. 22 averaged 35 $\frac{1}{2}$ per cent., I think a "Shareholder" must be under some (to me) unaccountable misapprehension; and I think he will find, if he makes enquiries at the company's offices, the prospects were never so brilliant as at present. It will surprise me if, by the next mail or two, do not bring us startling intelligence, which may cause an upward movement in the value of the shares of 5*l.* or 10*l.*, and possibly much more.

Dec. 31.

ANOTHER SHAREHOLDER.

WHAT IS ELECTRICITY?

SIR,—I have to apologise for not replying in last Saturday's Journal to Mr. Crickmer's letter of Dec. 26, but avail myself of this opportunity of doing so. Before entering further into the subject I must take exception to the mode adopted by Mr. Crickmer of placing statements to my credit which were never made by me. For instance, Mr. Crickmer says that I admit that water consists of oxygen and hydrogen, but in a solid state. What I really said was that Mr. Crickmer's theory amounted to this—"that water was composed of oxygen and hydrogen," the words "but in a solid state" not being added to the sentence in question.

Mr. Crickmer cannot deny that the oxygen obtained by the decomposition of water is identical in every respect with the gaseous oxygen existing in the atmosphere, and that both possess precisely similar properties, neither will he dispute that when gaseous hydrogen is burnt in contact with the oxygen gas of the air, that water is produced. If oxygen be a solid in the one case surely it must be so in the other, therefore, in order to thoroughly reconcile Mr. Crickmer's theory with established facts, it must be first assumed that one of the gases existing in our atmosphere (oxygen) is in a solid condition, an assumption few will feel inclined to admit, unless during a metaphorical fog.

Oxygen, when mechanically mixed with nitrogen in the air, being called a gas, I am at a loss to conceive why the same substance when isolated and pure should be called a solid. The fact of the element iron combining with the element oxygen to produce the solid body oxide of iron in Mr. Crickmer's experiment does not prove oxygen to be a solid, neither, in fact, does it prove it to exist there as a gas, and I suppose Mr. Crickmer would hardly presume to say in what form either the oxygen or the iron exists in the compound. What we know is that oxygen gas unites under certain conditions with metals to form oxides, and that gaseous (not solid) oxygen can be reproduced from the oxide. By prolonged heat, at a moderate temperature, in the air, the metallic element mercury combines with the gaseous element oxygen to produce oxide of mercury. By strongly heating the oxide gaseous (not solid) oxygen is again given off, and metallic mercury remains. In this experiment oxygen in its gaseous form is directly added to and withdrawn from the mercury, but I very much question whether Mr. Crickmer can explain the precise physical state of either element whilst actually combined together. It is mere assertion, without the slightest corroborative proof, to say that the oxygen itself is either a solid or a compound under such conditions. I now turn to Mr. Crickmer's method of proving the element oxygen to be a compound, which he figuratively accomplishes as follows:—A piece of red-hot iron weighing 7 ozs. is figuratively immersed in a bottle of oxygen gas weighing 1 oz., when the iron "will quickly take all the solid material out of Mr. Gledhill's bottle of oxygen gas, and the piece of iron will then weigh 8 ozs., and the heat liberated when the red-hot iron has decomposed the gas will pass through the bottle into the surrounding atmosphere, and will become mechanically mixed with the same by radiation. The piece of iron has now gained 1 oz., and that ounce is a solid material chemically combined with the some of the iron."

This explanation of Mr. Crickmer's supposed experiment is, to my mind, altogether unsatisfactory. There would not be solid, but gaseous, oxygen in the bottle to begin with. The gas may or may not become solid in the oxide by modification, but assuredly not by decomposition, as it is an elementary substance.

Neither does his experiment describing the passage of hydrogen gas over ignited oxide of copper prove that the former is either a solid or a compound, or that it is decomposed during the process. The experiment simply demonstrates that when oxide of copper is heated in contact with hydrogen it gives up as much of its oxygen as is necessary to form water, that portion of the oxide which has eliminated its oxygen being reduced to metallic copper, and the loss in weight of the oxide of copper precisely amounting to the weight

of oxygen contained in the water thus produced. So that in reality two gases, and not, as Mr. Crickmer states, one gas and one solid, are employed.

If this water be now decomposed—(say) by electricity—it is reconverted into two invisible, permanent, and elementary gases (not solids)—oxygen and hydrogen—which, in their isolated conditions, all the known means adopted by the most celebrated chemists have hitherto failed further to divide. Mr. Crickmer says hydrogen gas is decomposed during its passage over red-hot oxide of copper. I maintain that it is quite impossible for Mr. Crickmer to prove that the gas is decomposed or in any way changed thereby. Certainly the experiment described by him demonstrates no such decomposition of the hydrogen.

Mr. Crickmer very unfairly says I admit carbonic acid to be an element. I do nothing of the sort, this being, in fact, the first time I have mentioned the gas in this correspondence. He then very coolly challenges me to prove that carbonic acid is an elementary substance, or, in other words, that it does not consist of oxygen and carbon, whilst he will kindly undertake to prove the opposite. I trust my time can be better occupied than by attempting to show that twice two make one, or that the moon consists of cream cheese.

This letter must close my correspondence with Mr. Crickmer, as that gentleman, in my opinion, evidently advances theories, or, rather crochets, which are not at all supported by experimental facts. Shelve, near Shrewsbury. EDWARD GLEDHILL.

METEOROLOGY.

SIR,—In the Journal of Dec. 12 you did me the honour of inserting a letter of mine under the above heading, giving a theory of the weather according to which greater cold might be expected this winter than for some years past. I need not say that the prediction has already been amply justified. Indeed, the whole course of the late severe weather has been in exact accordance with the theory. Whilst the strong Polar current of air poured down over Europe, spreading out its icy blasts so as to embrace nearly the whole of the British Isles, the temperature at the extreme western stations, notably at Valentia and Scilly, kept all the while remarkably high for the time of the year. Immediately, too, on the Atlantic current gaining the mastery the temperature rose everywhere with great rapidity, and the thaw was most rapid and complete. I may now say that, notwithstanding the present very mild weather, the theory would lead to the expectation of a more or less quick return of the Polar current, and a repetition of cold weather. As the exposition of the theory in my former letter was condensed, and its comprehension not facilitated by a diagram, I fear it might not have been generally understood. The main channels of the two great currents of air therein spoken of are supposed to sway with a gradual pendulum-like motion between their extreme eastern and western limits. As the extreme eastern position was supposed to have been attained about the year 1872, and to have since retrograded westward, so that during the year from October, 1873, to October, 1874, we were practically midway between the two currents. The conclusion drawn is that now the position is further westward still, and consequently the Polar current is nearer to us. Our position may always be regarded as lying between the two currents, and to this fact is due the extreme fickleness of our climate. The main character of any season depends on the proximity or remoteness of the one or the other.

C. O. B.

EXTINCTION OF FIRE AT SEA.

SIR,—Although the extinction of fire at sea is highly desirable, it must, I think, be obvious to the least practical even, that the modification of Phillips's old Fire Annihilator, proposed by Messrs. Paton and Harris, of Glasgow, is not calculated to prove of such vast superiority as some suppose. The object of the pyroleter is identical with that of the annihilator—to generate carbonic acid gas, and circulate this gas amongst the burning materials—and both instruments, so far as the extinction of fire is concerned, have the same merits and the same drawbacks. In the case of the burning of the Cospatrik the annihilator, the extincutor, the pyroleter would all have stood the same chance. Now, as a matter of fact, most passenger vessels carry a few extincutors, and probably the Cospatrik did the same, but unless the fire be discovered before it has a firm hold of anything inflammable, or unless the fire be confined to a closed space, to an almost hermetically sealed chamber in fact, all apparatus of the annihilator class are perfectly worthless. The experiments with the annihilator will still be remembered by many. The unlucky inventor invited a large assemblage to witness the efficiency of the apparatus, the invitation was accepted, a model house was constructed, and filled with inflammable material, the inventor brought his annihilator into play as soon as the model had been ignited to represent an accidental fire, and both house and inflammables were speedily reduced to a heap of ashes, to the dismay of the fire annihilator proprietor.

The fire annihilator is nevertheless a valuable invention, and has been the means of saving an immense deal of life and property; the same may be said of the extincutor, but they are only useful when they can be instantly applied, so as to have control of the fire by replacing with carbonic oxide gas the air by which it is surrounded. The use of solution of bi-carbonate of soda, as proposed by Messrs. Paton and Harris, instead of the ordinary commercial bi-carbonate, appears objectionable, and the complication introduced in using pumps is altogether unnecessary. They get no carbonic acid gas from the excess of water, and the gas as generated has for all practical purposes sufficient force to play upon the fire. The non-scientific will perhaps better understand the whole question when it is explained that the object in the annihilator, extincutor, pyroleter, &c., is to produce the same gas which is contained in soda-water, the annihilator being the equivalent of the soda-water bottle. The great advantage of the annihilator and extincutor as compared with the pyroleter is that they are more simple, more portable, and I suppose cheaper. In these apparatus the useless arrangement of pumps can be dispensed with, because they are kept dormant until wanted, and the form of the old fire annihilator is the best of all. In this the bi-carbonate of soda should be placed in the lower part of the vessel (it acts better when well damped), and the proper quantity of acid contained in a bottle near the top. When a fire occurs a stopper is forced into the vessel, which breaks the acid bottle, and causes the evolution of carbonic acid gas. The bi-carbonate of soda may be used dry, and the acid diluted, so as to supply the necessary quantity of water if desired.

In Mr. Phillips's annihilator steam as well as carbonic acid was produced. The charge was made of charcoal 20 parts, nitrate of potash 60 parts, and gypsum 5 parts. These were boiled together in water, dried at 100°, and moulded into a brick, with a hollow to receive a bottle containing chlorate of potash and sugar, with a globe of sulphuric acid. Arrangements were made for breaking the bottle when necessary; the sulphuric acid causes the instantaneous combustion of the chlorate and sugar, which fires the charge. The vapours quickly issue in a dense cloud, and rapidly extinguish fire. In the cargo portion of ships such an apparatus is invaluable, as it can be quickly applied, and a closed space can be readily filled with an atmosphere in which fire cannot burn. It would, however, be necessary to use it with caution in the passenger portion of a ship, as carbonic acid and other gases are highly poisonous. J. B.

Jan. 3.

PREVENTION OF RAILWAY ACCIDENTS.

SIR,—I was very much surprised to read the account of the accident near Fowey Tunnel, on the Cornwall Mineral Railway, resulting in the destruction of a number of valuable railway trucks, and the serious injury of one man. Now, it is difficult to comprehend how any railway company at the present day can neglect the proper means to prevent a train running back down any incline, especially when at so little expense they could have a self-acting brake on the last truck of every train. I do not mean a truck or a van with a man in it, but a heavily laden truck, so arranged as not only to stop itself in an instant, but the whole train also. Indeed, all passenger trains that pass over inclined planes should be so fitted with a heavy truck. There is nothing like having the last truck heavy; it keeps the train steady, and if anything breaks in front the whole train is at once brought to a standstill. It is not neces-

sary that all carriages should be so fitted, and I am convinced that if the companies will take the matter up it will be of equal advantage in saving life and rolling-stock also.

James-street, Old-street, Jan. 6.

J. WALKER.

THE NASCENT COPPER PROCESS, AND CRENVER AND WHEEL ABRAHAM UNITED MINES.

SIR.—Some idea of the value of this process and the blissful ignorance of our mining representatives may be formed by a perusal of the letter in last week's Journal, signed "Another Mine Agent." Amidst many vain efforts to show that no mineral is wasted, he adds—"Doubtless throughout the Western counties burrows may be found that, with a good standard, would pay to some little extent for dressing, but they are few and far between." Any practical mining agent must, or should, know that no copper ores under 20 per cent. can be dressed to advantage—that is, they cannot be concentrated at any cost. The word dressing is a disgrace to this country. Take 100 tons of 2 per cent. ore, and repeated washings or dressings may reduce the quantity to 20 tons, but the result of the balance is the same—2 per cent.—the rest of the copper finding its way into the rivers, and similar results occur with rich ores. Perhaps "Another Mine Agent" will prove to your readers that there are no copper ores found giving as little as 2 per cent.; but, assuming that he fails to do so, may I ask what has become of the 2 per cent. article? Common sense tells me that it has been dressed to death, washed away; or, more fortunately, mine agents have given up the dressing as a bad job, and the ores still exist in the accumulated burrows which may be seen upon any extensive copper mine. I have paid some little attention to this matter, and am convinced that it is a common thing for all copper mines, and especially Crenver and Wheel Abraham, to average for every ton of lodestuff broken at least 1 per cent. of copper and 5 ozs. of silver, and from what I have seen at New Great Consols it will take 60 tons of 1 per cent. ore to give 1 ton of 60 per cent. precipitate, worth 45s. to 50s. per ton for copper; but this is not all, the 60 tons contain 300 ozs. of silver, which are packed into the 1 ton of precipitate. If this is not a success I should like to know what constitutes one; and the very fact of the New Great Consols producing some 14 tons of precipitate upon a small scale before putting up their present gigantic works, the whole affair being endorsed by several members of the Stock Exchange, proves that the preliminary practical results must have been highly satisfactory.—Jan. 6.

SHARKHOLDER.

CRENVER AND WHEEL ABRAHAM UNITED.

SIR.—"Shareholder" in last week's Journal appears to look upon the "Nascent Copper Process" as necessary to the salvation of these mines, and speaks of the prejudices of those in charge, &c. That process, I suppose, is a good thing, and, perhaps, will be introduced here after a sufficient trial of its efficacy has been made at New Great Consols. Capt. R. Pryor has great confidence in its efficacy. Meanwhile "Shareholder" should reserve his hard speeches about prejudice, &c., for the manager at the mine (Capt. Thomas) is said to be a very good miner, and fully minds his duties.

I have an impression that the mines would pay better at deeper levels; the deepest level appears to be only about 214 fms. under adit, which, I believe, is about 40 fms.—making in all about 254 fms. from surface, by no means a very deep mine, when compared with Dolcoath and some other mines in that district. To abandon the mines would be a pity, if not a great folly, under the prospects presented.—Jan. 4.

R. SYMONS.

WHITEHAVEN IRON MINES.

SIR.—I read under the above heading, in your reporting columns (Jan. 2), the following sentence from the pen of Capt. T. Rosewarne: "The railway to the King of Prussia will soon be opened for the carriage of ore from that point to Ravensglass." I presume the meaning is that the railway from Ravensglass to that point will soon be completed, leaving about 1½ mile to the mine incomplete. The ground being nearly level all the way, that link can be quickly supplied. This connection with the Furness Railway at Ravensglass will be found to be of great importance to the Whitehaven Company, because of the great saving thereby effected in the item of carriage. Their ores have hitherto been sent to Drigg station, at a charge of 8s. per ton, the distance being nearly nine miles over a hilly road. That is a heavy charge on iron ores, and by the railway will be reduced to perhaps 2s. or less—i.e., when the railway is completed to the mine.

When I was at the mine in the summer of 1872 there were three drifts (levels) into the mountain, the lowest being about, I think, 15 fms. above the river, affording ample room for No. 4 drift, which, it appears from Capt. Rosewarne's report, is now in progress. These four drifts will give room for the employment of a very large number of excavators—the more the better—and afford, I doubt not, by-and-bye good profits to the company. The highest backs are about 700 or 800 ft. above the river, and the length on the lode, and of the other lodes in the sett, is about 2 miles, if my memory is correct. I look upon the Whitehaven Mine (Eskdale) to be practically inexhaustible. The management is in good hands, if in those of Capt. Rosewarne.—*Truro*, Jan. 4.

R. SYMONS.

SOUTH ESKDALE MINE.

SIR.—I learn that the railway from the King of Prussia Inn to Ravensglass is nearly ready for traffic. This line, I understand, is the property of the Whitehaven Iron Company—constructed for the transit of their own ores from Eskdale Mine to Ravensglass, a station on the Furness Railway, which has a connection with all the railways of the country. But the line may be made to serve other companies who are operating in, or in the vicinity of, the Valley of Esk. One mine adjacent to Eskdale is called South Eskdale, and for dimensions exceeds any other sett known to me. Only think of a sett of 10,000 acres! Yet that is the estimated area of South Eskdale, which is under grant to Mr. T. Harvey, of London. There are seven known lodes in the sett, all of which merit attention; but among them there is one of extraordinary width, which should be the first subjected to the miners' tools. The want of a railway has hindered the works within the sett, but now that the railway is brought within about half a mile of the boundary I presume that Mr. Harvey will lay down a branch from his sett to the Eskdale Company's line. I have no doubt that for their own advantage the Eskdale Company will readily permit a connection with Mr. Harvey's mine.

I augur that the united products of Eskdale and South Eskdale will furnish an enormous traffic on the railway, and I doubt not that the result will be the working on other lodes further up the valley of Esk than either of those mines. When I was there in 1873 I understood that a sett or setts had been granted there. I would suggest to the Eskdale Company the question—Would it not be desirable to attach a passenger car to the mineral train to take passengers to and from Ravensglass, the station to be at the King of Prussia?—*Truro*, Jan. 4.

R. SYMONS.

BIRMINGHAM (BLAKELEY HALL) COAL AND IRONSTONE COMPANY.

SIR.—Kindly allow me, through the medium of your excellent and impartial Journal, to make a few observations on the above company. I am one of the subscribers to the debentures issued some eighteen months since. I was induced to invest my money from the apparently genuine and exceptional nature of the prospectus, and the names attached thereto. Some three weeks since the debenture-holders had forwarded to them a circular, disclosing a very unsatisfactory state of affairs, giving, of course, the usual amount of "unforeseen circumstances," &c., as the cause of failure in a concern which up to that time was believed to be in a flourishing condition—indeed, some of the most salient advantages set forth in the prospectus were in this circular flatly contradicted, and they (the debenture-holders) were finally invited to convert their debentures into shares of the company, as a means of retrieving the past. As it would appear that the first appeal to the debenture-holders to become shareholders met with but little response, further circulars were issued, wherein surprise is expressed that the debenture-holders had been so

supine. Now, Sir, to the debenture-holders the most astounding part of the whole proceeding seems to be the position and action taken by the solicitors to the debenture-holders towards them, as it appears to me that every proposal should have come from the other side. Again, why do they not give some information or explanation as to the manner in which the 100,000 already subscribed has been expended? It is merely stated that the directors have retired.

What I would suggest is, that more information be communicated to the debenture-holders as to the management and prospects of the undertaking and other matters—they will then, doubtless, prove themselves anxious, by becoming shareholders or otherwise, of rendering all the assistance they can, rather than impeding the actions of those who may be actively engaged in developing the property.

London, Jan. 5.

ONE INTERESTED.

THE CLEE HILL COLLIERY COMPANY.

SIR.—As one of the original holders of the shares of this company, I avail myself of your columns, which are ever open to the grievances of the mining public, to ask my fellow-shareholders if they do not think that some steps should be taken to improve the value of our property, and to create a chance even of getting some return for our outlay. Implicit faith is not, I am aware, to be placed in the promises of dividends made in the prospectus of a proposed company. Nevertheless, ignoring altogether the prospective 50 per cent. and upwards held out in this case, we were told that the concern, even with the admitted faulty management of the former proprietor, showed a profit, and "allowing matters to go on pretty much as they have done hitherto, and with no better supervision, would give a certain dividend of (say) 10 per cent. on the entire capital of the company." I think there is cause for dissatisfaction in the results, and the conclusion can only be arrived at that how defective must be the present management of the concern which, with an unusual high price ruling for coals, cannot pay one farthing of dividends. I am aware of the reasons given for the non-success of the company, but only partially believe them, and am not content that the directors and officials should have any money to play with to try costly experiments without paying something for it. Perhaps some shareholder or friend hailing from the neighbourhood of Ludlow would kindly enlighten us as to what is really doing at the colliery.

RUSTICUS.

EAST WHEEL LOVELL, AND ITS MANAGEMENT.

SIR.—More than a year ago you published in the Journal several letters reflecting upon the management of this mine. I beg to be allowed to say that no improvement has taken place since in the accounts furnished by the pursuer to the shareholders. In the last statement there is a sum amounting to about 2000l. charged for costs and merchants' bills, but no one can tell what coal costs for one month compared with another, what salaries are paid; or, in fact, the cost of any item connected with the mine. During the year 1874 one call of 30s. per share was made, and two dividends of 7s. 6d. per share were declared, so the shareholders are out of pocket 16s. per share for the year.

Wheel Jane, though not professing to have anything like such rich lodes, has paid a dividend of 1l. per share. How much longer will the patient shareholders of East Wheel bear such treatment? Recent events have proved that even when shareholders are unanimous in condemning their servants for mismanagement—as in the case of West Chiverton—the "feeling in Cornwall" is all in favour of the dismissed. It does not say much for the probity of the "feeling in Cornwall."

Jan. 6.

A SHAREHOLDER.

WEST TOLGUS MINE.

SIR.—I have watched with considerable interest the progress and development of this mine. I have rejoiced at the richness of the discoveries, and deplored their ill-fortune in the number of the breakages through the great strain upon their pumping-engines from an excessive quantity of water in wet seasons. I read with dreadfully wet and windy night; they could not be men of cowardly hearts who held on and pushed through and around the capstan during that gale. Many, like myself, will ask why such waste of physical strength, and might be health and life, to perform what could be done at 1s. in 1l. by a steam capstan. Has not the late accident cost as much as the fine steam capstan was sold for at Great Wheel Vor to Messrs. Harvey's—50l?

The ease and speed with which 10 or 20 tons of pitwork can be raised or dropped by two or three men one would have thought commended itself to every mine manager. Will any shareholder tell me why? Is it right, with a simple and cheap means at hand, to endanger life and money on old-fangled capstans and hempen ropes?

ENQUIRER.

WHEEL WHISPER.

SIR.—In last week's Journal appears a report that this mine has been wound-up. As I have received several applications from shareholders about it, will you give publicity to the fact that the mine is making good progress, with improving prospects, and with less than 1500l. of outstanding liabilities, and no idea of winding-up has been entertained.—*King William-street, London*.

R. LARCHIN, Sec.

BAMFYLDE MINING COMPANY.

SIR.—We observe the variety of quotations given in your advertising columns for these shares; it is, however, mortifying to know how shareholders are sometimes led away, and induced to sacrifice their property through such instruments (mining land sharks). One of these succeeded recently in frightening a shareholder out of his shares at about 1l. 19s., but took the precaution to have the stamp equal to 4l., at which price those shares were transferred on the same transfer at 4l. Conduct of this sort is really too bad, and we hope it will be a sufficient caution against shareholders parting with their shares.

ENDREAN AND CO.

Gracechurch-street, Jan. 8.

THE LANZI MINES, TUSCANY.

SIR.—In your Registrations of Companies a week ago you make the shares of this concern to be 1l. instead of 10l. As I am a subscriber for 2000l., and as the error is working mischief and demanding explanation, I shall be obliged by your publishing this note, and appending your own remarks. The shares have been taken up privately, or nearly so, no public advertisement has been needed, or the concern asked would not have mattered.

EDWIN SUNDERLAND.

Pembroke House, Edgbaston, Jan. 7.

[For remainder of Original Correspondence, see to-day's Journal.]

FOREIGN MINING AND METALLURGY.

Official Belgian returns show that in the first 11 months of last year rails were exported from Belgium to the extent of 84,724 tons. This total shows an increase of 23,160 tons upon the corresponding period of 1873, and one of 10,600 tons upon the corresponding period of 1872. Switzerland, Turkey, and the Low Countries were last year the largest external clients of Belgium in the matter of rails. The exports of plates from Belgium exceeded in the first 11 months of last year the exports of the corresponding period of 1873 by 7400 tons, and those of the corresponding period of 1872 by 2000 tons. The aggregate exports of plates in the first 11 months of last year were 24,553 tons, of which 7817 tons went to the Low Countries, 4023 tons to England, 3129 tons to Russia, and 3320 tons to France. The exports of merchants' iron from Belgium in the first 11 months of last year presented an increase of 20,500 tons, as compared with the corresponding period of 1873, and one of 5465 tons as compared with the corresponding period of 1872. The aggregate exports of merchants' iron from Belgium in the first 11 months of last year amounted to 95,363 tons. Adding together all classes of iron, we find that Belgium exported 252,339 tons in the first 11 months of last year, showing an increase of 44,600 tons, as compared with the corresponding period of 1873. The imports of minerals into Belgium in November amounted to 64,683 tons, and in the first 11 months of last year to 687,322 tons. The imports of rough pig into Belgium in the first 11 months of last year amounted to 139,694 tons. This total presented little change when compared with the imports of the corresponding period of 1873, but it exceeded by 17,000 tons those of the corresponding period of 1872. In the first 11 months of last year Belgium only imported 400 tons of plates, 13,000 tons of rails, and 2863 tons of other iron. There is little change to report with respect to current aspects of the Belgian iron trade; the future appears to be attended, however, with a good many uncertainties. Upon the whole, a fresh reduction in prices is regarded as probable; it is to be hoped, of course, that this reduction will not be one of any very great importance. The imports of coal into Belgium in the first 11 months of last year are officially returned at 398,012 tons. This total was 192,000 tons smaller than the corresponding imports of the corresponding period of 1873, but 215,150 tons more than the corresponding imports of the corresponding period of 1872. The exports of coal from Belgium in the first 11 months of last year amounted to 3,571,285 tons, or 325,000 tons less than those of the corresponding period of 1873. The exports of coke from Belgium in the first 11 months of last year amounted to 514,389 tons, as compared with 752,132 tons in the corresponding period of 1873.

Our Consul at Algiers (France) writes to the effect that mining industry has made a new step in the province of Bone, in consequence of the sale of the Ain-Barbar copper mine to an English company. This mine, conceded by the French Government, was worked for years, but so badly that when the researches were made and good ground opened, no funds were left to work it, and the concern was abandoned. It is stated that the ore contains 10 per cent. of metal, and that the lode includes also large quantities of valuable blende (sulphide of zinc), commonly called "black-jack," and containing 41 per cent. The opinion is expressed that this concern will prove valuable to the new proprietors, which, it is hoped will attract more capitalists to that rich mineral district. It is further stated that

the zinc mine of Nador, belonging to the Belgian company of La Vieille Montagne, continues to lay down stocks of ore until a new railway is built, which will pass close to and increase largely the production of the mine.

A strike which had occurred in the Charleroi coal district has happily terminated, and both masters and men may be congratulated upon this result. The Belgian coal trade has remained without any material alteration, notwithstanding the advent of severe winter weather. The market for coal for industrial purposes continues to exhibit depression. The Monceau-Fontaine and Martinet Collieries Company has been paying this week a dividend for 1874 at the rate of 2l. per share. The Crachet and Piquery Collieries Company has been paying this week a dividend of 1l. per share. A similar dividend has been in course of payment by the North of Charleroi Collieries Company.

The weather has been very cold in France, but the demand, even for domestic qualities of coal, has not been much affected in consequence. The iron trade has remained quiet, and the depression of the French metallurgical interest is sufficient to explain everything. The past week has also formed part of what may be regarded as the dead season. M. Lavelly, well known in connection with the Suez Canal, has been elected president of the French Society of Civil Engineers for 1875. The Liverdon Forges Company will pay on Jan. 14 the balance of its dividend for 1873-4, or 14s. per share.

The French iron trade has exhibited little change. No revival in affairs is anticipated until the spring—that is, until March or April. A similar revival, it will be remembered, was anticipated half-a-year since, but it never occurred. There are some complaints as to the diminished richness of Mokta-el-Hadid iron minerals; the Mokta-el-Hadid Iron Minerals Company has published a note to the effect that the value of the minerals has experienced no real falling off.

The Ruhr Coalowners' Association has just held a general meeting at Essen. The meeting adopted a resolution in favour of the employment of young people of from 14 to 16 years of age in mines, subject to a special inspection, and subject also to the authority of the mines doctor. The meeting next discussed the question of the Emscher Canal; this canal commencing at Dortmund would follow the Emscher as far as the Rhine—that is, it would accommodate all the northern portion of the Ruhr basin. The estimated cost is 1,600,000l., and the canal, if carried out, would accommodate vessels of 600 tons burthen. The project is regarded with favour by the industrialists of the Ruhr district. Measures are under consideration with the view to the adoption of such a reduced railway tariffation as would enable the coal of the Ruhr district to be forwarded to Bremen, Hamburg, and Berlin.

From Berlin we learn that a crisis in the iron trade is expected. Herr Krupp, of Essen, and other large manufacturers have dismissed numbers of their workmen, and have given a notice of a reduction of wages. The *Cologne Gazette* gives a gloomy picture of the state of trade in Germany. It says—"In 1874, although the great bubble schemes burst in the summer of 1873, and although last year a plentiful harvest of corn and wine came to our relief, the consequences of the crisis are still felt. Numerous undertakings are depreciated, and even more lamentable than the losses of the promoters are the mischievous results of the sudden excessive rise in wages which could not possibly last, the luxurious habits, the strikes, and all that these involve on the labouring classes and the whole industrial life of the German nation. Habits of indolence and gluttony have been established which it will be hard to eradicate. In many establishments at Berlin work is still suspended at noon on Saturday, and not resumed till late on Tuesday morning. The natural result is that the products of German industry have become dearer, that our exports diminish, and that we import many things from abroad which we could very well manufacture ourselves. A characteristic example of this is that the city of Berlin is procuring 300,000 centers of iron piping for the canalisation scheme from England, instead of employing native industry. If, as is alleged, the English supply it at half a thaler per center cheaper than our own works, no objection can be offered to the saving of 150,000 thalers. The truth is that as regards the production of iron, which we thought was a nucleus of German prosperity likely to surpass foreign countries, our hopes have speedily been dispelled. One good effect of the scarcity of employment, in itself very deplorable, which has occasioned numerous dismissals at Berlin at the end of the year, is that, as the promises of the Socialists and other demagogues have not been realised, the working men now find themselves obliged to revert to their old habits of industry and frugality."

ARSENIC.—The annual returns received at the Mining Record Office show that 5449 tons of arsenic were produced in England in the year 1873. More than a third of it came from the Devon Great Consols Mine. The Commissioners who have been for some years enquiring into the pollution of rivers state in their fifth report, recently issued, that at this mine the general drainage from the dressing-floors and the tanks in which the copper is precipitated was found, upon analysis of samples collected by them, to contain a very much larger proportion of arsenic than the maximum they would allow upon admission into any stream, no less, indeed, than 0.6 part in 100,000 parts of water, their suggested standard permitting only 0.05 part; but this drainage is not discharged directly into the Tamar, but is first mixed with a very large volume of water used upon the mine for power only. At this time the mundic or arsenical pyrites is utilised for the manufacture of arsenious acid. It is roasted in a current of air, and thereby converted into marketable arsenious acid, or white arsenic; and of this, at the time of the Commissioners' visit of inspection, as much as 165 tons, sometimes 200 tons, were, as they were informed, being sold in a month. They regard it as a startling reflection that, even at the lower rate of sale, there would leave this single mine every month a quantity of white arsenic sufficient to destroy the lives of more than 500,000,000 of human beings. The Commissioners saw stored in the warehouses of the mine, already packed for sale, a quantity of white arsenic probably sufficient to destroy every living animal upon the face of the earth. They add, truly enough, that it is perhaps still more startling to reflect that there is at present no efficient law to prevent manifold this amount of this deadly material from being cast every month into the rivers and watercourses of this country; not, it is true, to expend its poisonous energy at once, for the mundic is insoluble in water, but, by its slow decomposition, to render rivers so treated poisonous and uninhabitable by fish for many generations. The Commissioners consider that in the case of mines upon which arsenic is actually manufactured, it is only reasonable that (as is now the case with the retail sale of this article) the manufacture of a poison so virulent should be subject to special State supervision; and they submit that an officer should be empowered to require that the best practicable means be taken not only to prevent the poisoning of the air by the volatilisation of the arsenic, but also to hinder the access of the poison to running water. They are driven to this special recommendation because it is impossible to prevent altogether the occurrence of the poison in the effluent water of such mines, and there is no practicable method of removing it from water once contaminated, so as to bring the proportion below the maximum named in their proposed table of standards of impurity which may be allowed in effluent mine water admitted into rivers and streams. A single officer would probably be able to inspect all such establishments in the kingdom.

ELECTRICAL DECOMPOSITION.—In the third lecture of the juvenile course by Professor Gladstone, F.R.S., it was shown that in every voltaic cell of whatever kind there is a liquid suffering decomposition. This is closely connected with the difference of electrical condition into which the two different metals are placed by mere contact. Thus, if zinc and copper touch at a great many places they form a couple that can decompose water and many other substances easily. Such decomposition is called "electrolysis," and besides the primary electrolysis in the cells, a secondary electrolysis can be produced in any part of the circuit. Water was resolved into its constituent gases—oxygen and hydrogen; salts were split up into acids and bases, the earthy oxides were decomposed, and crystals of different metals were grown from their respective salts. Some of the principal discoveries made at the Royal Institution by Davy and Faraday were described and illustrated during the lecture.

METALLURGICAL FURNACE.—The object of the invention of Mr. S. P. TASKER, of Philadelphia, United States, is such a construction of the furnace as will localise a much greater degree of heat at a certain part of it than is admitted to the rest of the heating chamber for the purpose of adapting the heat to articles which require a higher heat at one part than throughout the remainder thereof. The invention relates to a furnace having a central chamber throughout its whole length for the reception of the bent skelp or other article, and side chambers, or flues, one on each side of said central chamber, each side flue being separated by a wall from the central chamber, having an open communication at top with the same throughout its whole length, and communicating at different points through ports in the walls at the floor of the furnace, so that the flames may be brought over the walls directly upon the edges of the skelp which are uppermost, for the purpose of receiving a high degree of heat, and no flame being permitted to pass into the central chamber except through the above-named ports. The passage of the flames through these ports is regulated by refractory plugs or other suitable device, by which they may be diminished in area, or entirely closed, in accommodation to the amount of heat required for the lower portion of the skelp or other article.

BORING ROCKS, AND DRESSING STONE.—Mr. J. MACINTOSH, of the Strand, has patented some improvements in boring and dressing rocks and other mineral substances, and dressing stone. This invention consists in the use of chilled cast metal ribs or cutters to be applied to rock-borers, saws, and stone-dressers, the object being to substitute cutters of hard metal for the diamond cutters at present in use. Mortices are formed in the boring tube, and these cutting teeth are inserted therein. In boring rods a socket is formed in the cutter which receives the rod. In saws the teeth are inserted in the periphery or edges. In borers where tubes are used the teeth may be cast in one piece like a ring and inserted in a corresponding seat.

PREVENTING BOILER EXPLOSIONS.—An improved mechanism or apparatus to be used in conjunction with steam-boilers, either as a low-water-alarm, or as an automatic water-feeder, has been patented by Mr. JOSEPH PARTRIDGE, of Pelsall, near Walsall, who fixes within the boiler a valve so arranged with a lever and float as that upon the descent of the float below a certain point the valve is opened. This action is obtained by placing the fulcrum between the valve and the float. A pipe communicating with the said valve passes from thence to the outside of the boiler, and is left open or provided with a steam-whistle, or is made to communicate with the feed-water pipe. A weight or spring is used to assist the steam in keeping the valve to its face when the apparatus is used as an automatic

water-feeder. Fine wire-gauze is used to protect the valve in cases where the water holds much solid matter in suspension. A cock may be used instead of the valve before mentioned.

IMPROVEMENTS IN STEAM-BOILERS.—The invention of Messrs. SANDERSON and Co., of Galashiels, relates to improvements in boilers of the French or elephant kind, these improvements consisting in the introduction of flues in the lower compartments, making such flues inclined and taper, so as to give room for a man-hole at one end, and providing them with transverse conical water-tubes, arranged helically; in arranging also external return flues, and providing them with flaps or shutters to regulate draught, and to cause the hot gases to impinge on the boiler surface. In boilers of this kind, intended to work at extreme pressures, or having an extra number of transverse water-tubes, the shell is strengthened by overlapping the flanges of the tubes, and rivetting the overlapped parts to the shell and to each other. For marine purposes the upper compartments are divided by plates to prevent the lashing of the water.

STEAM-ENGINE GOVERNORS.—The objects of the invention of Messrs. JUDSON and COGSWELL, of Rochester, New York, U.S., are, first, to render the governor more sensitive to variations of engine speed caused by variations in boiler pressure or in the resistance against which the engine labours; also to diminish the increase of engine speed found necessary heretofore to lift the balls from their lowest to their highest position, while they operate the valve from its wide open to its closed or nearly closed positions. Second, to prevent the transmission of the impulses or jerks of the engine from the driving pulley to the governor caused by the spasmodic and unequal action of the steam, which impulses cause irregular pendulum oscillations of the governor balls, and an unequal or pumping action of the regulating valve which admits steam to the cylinder, and consequently irregular and unequal action of the engine itself.

METALLURGICAL FURNACES.—The invention of Messrs. BAINBRIDGE and PINKNEY, of Middleton in Teesdale and Eggleston, Durham, relates to metallurgical and other furnaces used for manufacturing purposes, the furnaces of stationary, marine, and locomotive steam-boilers, and to cooking and heating stoves and fire-places; and consists in arrangements whereby the air used to support combustion is heated on its way to the furnace or fire-place, and is caused to pass down through the fire. According to this invention the fire-bars are made hollow, and the air for supporting combustion is caused to pass through them into a flue or heating chamber, and thence down through the fuel, the ash-pit being closed and the necessary downward draught being caused by an inverted fire-bridge, by

which arrangement the smoke is consumed and the fuel is economised. In substitution for or in addition to the hollow fire-bars for heating the air, flues are in some cases arranged so that the said air may be passed through them on its way to the fire.

TRANSPORTING PASSENGERS ACROSS RIVERS.—Mr. H. D. MUIRHEAD, of Cannon-street, proposes the employment of a long platform or bridge, supported on wheels, travelling on rails or other ways on the bed of a river or other channel, the motive power for working the bridge being located either thereon or on shore, and applied to wire ropes or hawsers stretched across from shore to shore.

IMPROVED HOT BLAST APPARATUS.—The object of the invention of Mr. H. ESSEX, of Meadville, Pennsylvania, is to furnish an apparatus for producing and supplying a hot-air blast for smelting or other purposes. The said invention consists in an air heating and forcing vessel, or two or more of such vessels, provided with suitable openings for the entrance of cold air, for the exit of waste hot air, and for the exit of hot air under pressure towards the place where the blast is required; it also consists in the construction and combination of parts.

COMPRESSED AIR CARRIAGES.—The invention of Mr. E. HAVARD, of Courbevoie, France, consists of locomotives running on common roads, and intended to convey travellers or goods, or to tow boats on canals and rivers, which are distinguished from other locomotive engines in that the motive power and conveying carriage are on the same framework, and also by the combination of the improved parts to accomplish this result.

CHEAP GAS.—Mr. W. HARKNESS, of Providence, U.S., proposes the production of illuminating gas by decomposing steam, and uniting the resulting gas together with the gases given off by red-hot coal when the steam is passed through it with hydro-carbon vapours, by which a permanent or fixed gas of high illuminating power may be produced at a very cheap rate.

IMPROVED STEAM PACKING.—The invention of Messrs. HAMMOND and MORRIS, of Leeds, consists of a seamless ring, burnt together at joining preferably of lead, but other metals combined or separately of a soft and ductile nature may be used. No whitelead or any other substance generally employed in making steam-tight joints is necessary with this invention.

ARTIFICIAL FUEL.—The invention of Mr. C. KINGSFORD, of Fulham, mainly relates to mixing slacks of various coals, coke, or other carbonaceous materials, with Portland or other hydraulic cements in suitable manner and proportion. Also to treating artificial fuels with coal tar, common pitch, asphalt, or other bituminous substances dissolved in hydro carbon or mineral oil.

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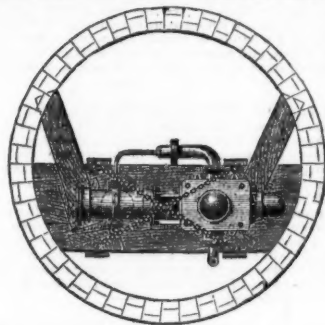
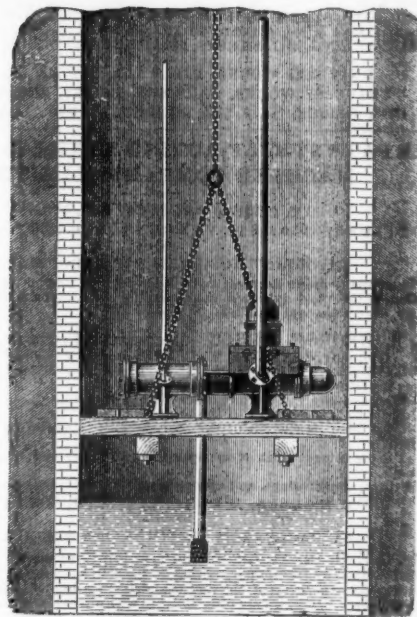
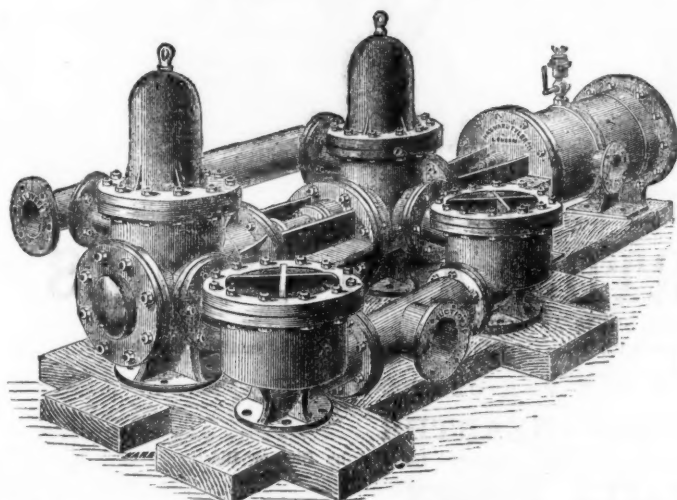
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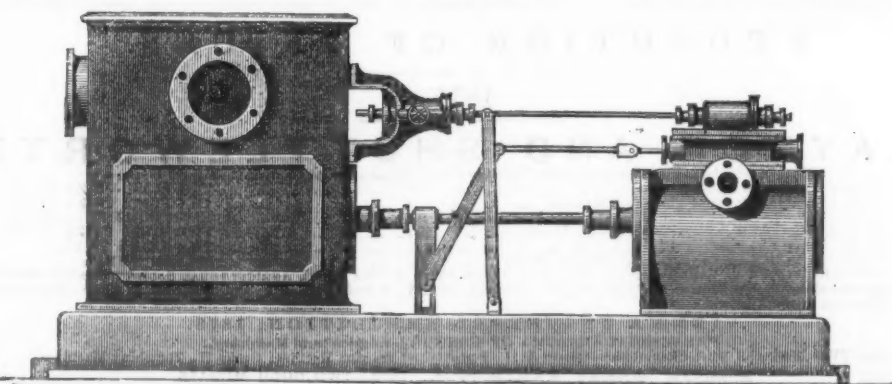
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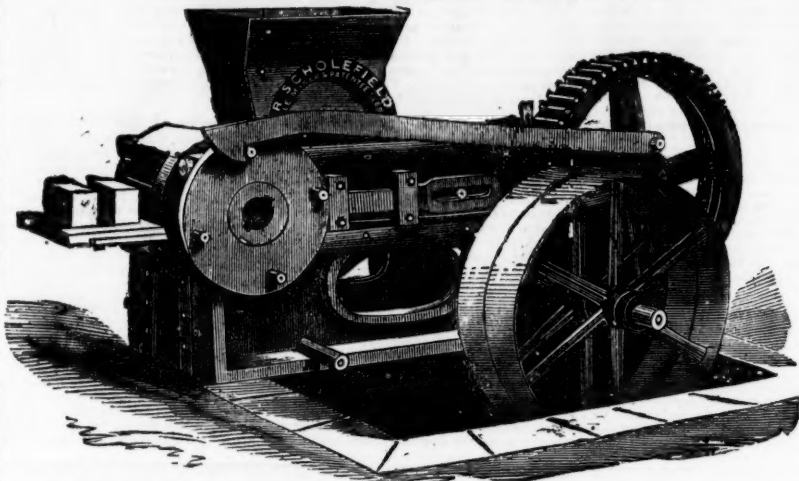
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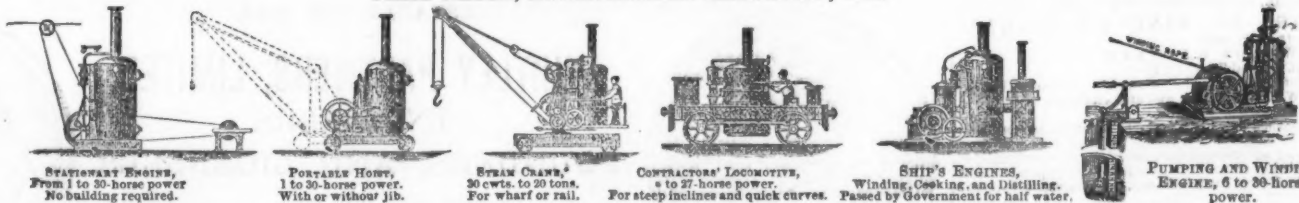
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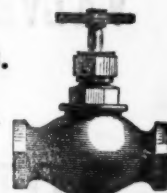
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